

WHAT IS CLAIMED IS:

1. A method of electronically learning a signature, comprising the steps of:
sampling a signature and obtaining raw data representative thereof using a
5 recursive sampling process;
translating the raw data into high dimension vectors; and
extracting, via an unsupervised neural network, high order principal components of the high dimension vectors by cumulative ortho-normalization.
- 10 2. The method of claim 1, further comprising integrating the high order principal components by generating a value r corresponding to a ratio of the number of vectors within an ellipsoid to the total number of vectors and a value s , the value s corresponding to the average of distances of all vectors within the ellipsoid.
- 15 3. The method of claim 2, further comprising:
calculating a value $A = (\text{average } r - \text{current signature sample } r)^2 / (\text{variance of } r)$ and $B = (\text{average } s - \text{current signature sample } s)^2 / (\text{variance of } s)$; and
multiplying the values A and B together.
- 20 4. The method of Claim 3, wherein multiplying the values A and B together comprises multiplying the values A and B together in a Pi neuron.

5. Software for electronically learning a signature, the software encoded in media and operable when executed to:

sample a signature and obtaining raw data representative thereof using a recursive sampling process;

5 translate the raw data into high dimension vectors; and

extract, via an unsupervised neural network, high order principal components of the high dimension vectors by cumulative ortho-normalization.

6. The software of claim 5, further operable to integrate the high order
10 principal components by generating a value r corresponding to a ratio of the number of vectors within an ellipsoid to the total number of vectors and a value s, the value s corresponding to the average of distances of all vectors within the ellipsoid.

7. The software of claim 6, further operable to:

15 calculate a value $A = (\text{average } r - \text{current signature sample } r)^2 / (\text{variance of } r)$
and $B = (\text{average } s - \text{current signature sample } s)^2 / (\text{variance of } s)$; and
multiply the values A and B together.

8. The software of Claim 7, wherein the software operable to multiply the
20 values A and B together comprises the software operable to multiply the values A and B together in a Pi neuron.

9. A computer for electronically learning a signature, comprising:
memory; and
one or more processors collectively operable to:

5 sample a signature and obtaining raw data representative thereof using
a recursive sampling process;
translate the raw data into high dimension vectors; and
extract, via an unsupervised neural network, high order principal
components of the high dimension vectors by cumulative ortho-normalization.

10 10. The computer of claim 9, the one or more processors further operable
to integrate the high order principal components by generating a value r
corresponding to a ratio of the number of vectors within an ellipsoid to the total
number of vectors and a value s , the value s corresponding to the average of distances
of all vectors within the ellipsoid.

15 11. The computer of claim 10, the one or more processors further operable
to:

calculate a value $A = (\text{average } r - \text{current signature sample } r)^2 / (\text{variance of } r)$
and $B = (\text{average } s - \text{current signature sample } s)^2 / (\text{variance of } s)$; and
20 multiply the values A and B together.

12. The computer of Claim 11, wherein the one or more processors
operable to multiply the values A and B together comprise the one or more processors
operable to multiply the values A and B together in a Pi neuron.

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13. A system for electronically learning a signature comprising:
- means for sampling a signature and obtaining raw data representative thereof using a recursive sampling process;
 - means for translating the raw data into high dimension vectors; and
 - 5 means for extracting, via an unsupervised neural network, high order principal components of the high dimension vectors by cumulative ortho-normalization.